Effect of Using Herbal Mixture Extract and *Camellia Sinensis* on Weight Loss in Over Weight and Obese Humans as Therapy for Obesity

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Abstract: Obesity is becoming increasingly common and recognized as a major public health problem worldwide. It is associated with multiple chronic health conditions including heart disease, hypertension, hyperlipidemia, diabetes, hyperinsulinemia, and cancer. The present investigation aims to determine i) the effect of using a mixture of natural herbs (Mallow, Senna and Sage) on weight loss in overweight and obese humans, ii) the effect of using green tea on weight loss in over weight and obese humans, and comparative between them. A total of 59 persons volunteers (17 males and 41 females), 22-39 year, were recruited into the study.Subjects were divided into two main groups, the 1st group contained 33 volunteers (group 1). The 2nd group contained 26 person volunteers (group 2). Subject age sex, anthropometric measurements, body mass index, state healthy, adverse effects associated with intake of herbs and 24-hours recall food intake were recorded, the Statistical analysis were done. Results showed that the ratio of males and females was 29.32% and 70.68% respectively. Distribution of the sample respondents according to age at 67.24% in age group (18: 30) and 32.76% in age group (31: 39). Also found that 34.48% suffer from overweight and 65.52% of the sample suffers from morbid obesity. The results found that 1.72% suffers from diabetes and 3.44% suffers from hypertension, in group (2) detected that 1.72% and 1.27% were found to be suffering from some insomnia and diarrhea respectively. The group (1) reported consuming adequate quantities from carbohydrate when compared with RDA. As for protein, reported consuming more than the recommended intake of protein (128.7 g/d). The fat intake was 80.2 gm/d with significant increase. The results of macronutrients intake for green tea, the carbohydrate intake was 365 gm/d with no significant difference than RDA. While protein was 136.4 g/d with significant increase. Intake of fat was 77.5 g /d with low significant increase. The loss weight continued during experiment weeks with increasing experiment period. At the end of the experiment, total loss weight was 8.9 kg in group (1) while in group (2) was 5.6 kg with positive rate which didn't affect the health situation, group (1) gave significant increase in loss weight when compared with group (2). Based on our results, we conclude that the intake of mixture herbs succeeded in reducing body weight without adverse effect, green tea caused some positive effects. Therefore, it could be recommended that the use of herbal mixture and green tea should be ingested as natural herbs to obese human, further investigations also should be carried out with different doses for more prolonged periods to complete the profile of the herbs with the studying of more effects at experimental animals in order to introduce it as a natural antiobesity agent.
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Key words: natural herbs, green tea, *Camellia sinensis*, mallow, Senna, sage, weight loss, obesity, obese humans.

1. Introduction

Obesity is generally defined as condition in which there is an abnormal accumulation of fat in body tissue **(Bray, 1985)**. It is becoming increasingly common and recognized as a major public health problem worldwide **(Toplak *et al.*, 2005).** It is associated with multiple chronic health conditions including heart disease, hypertension, hyperlipidemia, diabetes, hyperinsulinemia, and cancer **(National Heart, Lung and Blood Institute, 1998).** It is caused by causes may be hereditary factory, glandular and hormonal malfunction, malnutrition, emotion tension, slow metabolism, boredom, habit and love of food. It is associated with chronic conditions such as kidney diseases, gallstones (from saturated fat and cholesterol), complications of pregnancy and psychological problems **(Kirschmann, 1996).**

There is considerable evidence suggesting that weight loss of 5% to 10% of initial body weight substantially improves the health of obese patients **(Williamson *et al.*, 1995).** Currently, numerous drugs and herbs are tried for treating obesity with meals, **(Smith *et al.*, 1996 and Zhi *et al.*, 1995).** Nowadays there is an increased trend for using plants in therapy "back to nature" instead of using synthetic drugs which may have adverse effects. Traditional medicinal plants are often cheaper, locally available, and easily consumable (raw or as simple medicinal preparations). These simple medicinal preparations often mediate beneficial responses due to their active chemical constituents. The rationale for using herbs in combination is that herbs have chemicals components which can bring strong effects on body. When herbs are used in combination, they may potentially neutralize undesirable effects of each other and

synergize each other. Therefore, it is preferable to use herbal combinations instead of depending on a single herb **(Moro and Basile, 2000).**

Malva parviflora L. (Malow) is an annual or perennial herb that is native to Northern Africa, Europe and Asia and is widely naturalized elsewhere. Common names include cheese weed, cheese weed mallow, Egyptian mallow, least mallow, little mallow **(USDA, 2008).** It is growing to 50 cm in height. The broad leaves have 5 to 7 lobes and are 8 to 10 cm in diameter **(Bouriche *et al.,* 2011).** Senna (*Cassia angustifolia*) "Cassia" has medical properties those of Senna seem to be more pronounced. It is called aragvadha ("disease killer"). It contains elevated quantities of anthraquinones and consequently is mainly useful against some gastrointestinal conditions **(David, 2004).**

Salvia officinalis L. (sage) is a medicinal and aromatic plant of the Lamiaceae (Labiatae) family, native to Mediterranean countries which today is cultivated all over the world **(John, 1999).** It is a popular herb commonly used as a culinary spice for flavoring and seasoning that has also been used for centuries in folk medicine for the treatment of a variety of ailments **(Walker *et al.,* 2004).** Green tea (*Camellia sinensis*) one of the most popular beverages consumed in Asian countries, contains a series of polyphenols known as catechins, which consist mainly of epigallocatechin gallate (EGCG), epicatechin gallate and gallocatechin gallate. Tea have pharmacological effects, such as antibacterial **(Shiota *et al.,* 1999)** and anti-carcinogenic activities **(Yang and Wang, 1993)** and lowering of plasma lipids and glucose levels **(Muramatsu *et al.,* 1986;Matsumoto *et al.,* 1993),** and anti-atherogenic effects. **(Miura *et al.,* 2001 and Chyu *et al.,* 2004)**. It has been studying the antiobesity effects of tea catechins in humans and rodents **(Murase *et al.,* 2002 and Nagao *et al.,* 2005)** long-term intake of tea catechins is beneficial in reducing high fat diet-induced obesity **(Murase *et al.,* 2002).**

Using of tea catechins for the treatment and prevention of disease has seen an increase **(Mukhtar and Ahmad, 2000**). Recent reports by **Kao *et al.*????** showed that intraperitoneal injection of epigallocatechin gallate (EGCG) modulates appetite and reduces food intake through the leptin receptor-independent pathway in rats **(Kao *et al.,* 2000a and Kao *et al.,* 2000b).**

Objectives

The present investigation aims to determine i) the effect of using a mixture of natural herbs (Mallow, Senna and Sage) on weight loss in overweight and obese humans, ii) the effect of using green tea on weight loss in over weight and obese humans, and comparative between them.

2. Materials And Methods

Materials:

Fresh Mallow purchased from the local market (50gm), was dried and grounded**,** and dry Senna (25 gm) and Sage (25 gm) were obtained from the local market then mixed together to constitution tea (1).Green tea was obtained from the local market dried.

Subjects:

A total of 59 persons volunteers (17 males and 41 females), 22-39 years, were recruited into the study in specialist healthy center.Subjects were divided into two main groups, the 1st group contained 33 volunteers (group 1) height: (1.70± 0.07 m) and body mass (82.55±5.2 kg). The 2nd group contained 26 person volunteers (group 2). Height: 1.68± 0.08 m and body mass (75.35±4.3 kg).Twenty of them suffered from overweight and thirty nine suffered from morbid obesity. They received clinical investigation to knowing the health status, combination disease with obesity and combination symptoms with taking the herbs.

Methods:

Subject age, sex, anthropometric measurements (weight and tall), body mass index, situation healthy and adverse effects associated with intake of herbs were recorded by for subject on a study questionnaire. A 24-hour recall food intake during the study was recorded and then data was converted to nutrient intake variables using Food Intake Analysis System (**FIAS, 1998**), and then compared the food intake with recommended dietary allowances (RDA) **(WHO, 2000).**

Tea preparation:

Preparation of tea 1 (mixture tea):

Each 100g contain: 50gm Mallow, 25 gm Sage and 25 gm Senna, the tea was freshly prepared by taking 2 g from this mixture and put in cup and added 200 ml of boiling water (without sugar) to the mixture then thoroughly mixing with spoon for one min. Then allowing it to steep for 5 min.

Preparation of tea 2 (green tea):

The tea was freshly prepared by taking 2 g from green tea and put in cup and added 200 ml of boiling water (without sugar) to the mixture then mixing for one min. Then allowing it to steep for 5 min.

Study Phase I:

Each subject of Group 1 was instructed to ingest 1 cup [cup =200 ml] from the mixture of herbs (Mallow, Senna and Sage) 3 times a day, one hour after each meal for 6 weeks. Body weights measurements were recorded at the end of each week.

Study Phase II:

Each subject of Group 2 was instructed to ingest drink 1 cup [cup =200 ml] from green tea 3 times a day, one hour after each meal for 6 weeks. After the three main meals with one hour. The feeding experiment lasted for 6 weeks. Body weights

measurements were also recorded at the end of the each week.

Statistical Analysis

The significance of the main effects was determined by analysis of variance (ANOVA). The significance of various treatments was evaluated by Duncan's multiple range test (P<0.05). All analysis was made using a software package "Costat" version, a product of cohort software Berkley, California **(Duncan, 1955).**

3. Results

Table (1) shows the basic demographic data and the effect of mixture herbs and green tea on the 59 subjects:

The basic demographic data on the 59 subjects recruited into the study and the adverse effect of green tea were presented in Table (1). The results revealed the ratio of males and females were 29.32% and 70.68% respectively. The distribution of the sample respondents according to age at 67.24% in age group (18: 30) as well as the proportion of 32.76% in age group (31: 39) this period act youngest and adults. Also found that 65.52% of the sample suffers from morbid obesity and ratio 34.48% suffers from overweight.

Results in table (1) showed that 1.72% suffers from diabetes and 3.44% suffers from hypertension. Sample distribution according the adverse effect of the green tea was illustrated in table (1) for green tea detected that 1.72% and 1.27% were found to be suffering from some insomnia and diarrhea respectively, this percentage is not significant.

Fig. (1) shows the average of food intake from macronutrients during the study period:

Fig. (1) represented the Daily macronutrient intake for the group (1) was 417 gm/day. It was adequate quantities from carbohydrate when compared with RDA. As for protein, reported consuming more than the recommended intake of protein per day the average was 128.7 gm/day gave low significant increase when compared with RDA (114.4 % of RDA). When comparing the fat intake was 80.2 gm/d. (120.4% of RDA) with significant increase.

Also Fig(1) showed that the results of macronutrients intake for group (2) (green tea), when comparing the carbohydrate intake, we found that the group (2) was 365 gm/d with no significant difference than RDA. While protein was 136.4 gm/d (121.2 % of RDA) with low significant increase when compared with RDA. Intake of fat was 77.5 gm /d (116.4% of RDA) with low significant increase when compared with RDA. As shown in Fig. (1) There was no significant difference ($p < 0.5$) between two groups in macronutrients intake.

Fig. (2) shows average of food intake from micronutrients during the study period:

The micronutrient intake per day, for tea experiments recorded in Fig (2) , group (1) (mixture herbs), vit. (C) intake was 80.2 mg /d gave significant increase, while Ca. intake was (95.4 mg/d) gave significant decrease when compared with RDA. Also, niacin and iron intake were 20 mg/d and 12 mg/d respectively without difference significant when compared with RDA.

Group (2) (green tea), as for vit. (C) intake was (63.1 mg/d) had a significant increase when compared with RDA. Niacin and Ca. intake were (10.1 mg /d) and (102.3) respectively had a significant decrease. As for iron intake was 16 mg /d without difference significant when compared with RDA. Also, Fig. (2) illustrated that there was no significant difference between two experiments in micronutrient intake vit. (C), Ca and iron) except niacin which gave significant decrease in group (2) when compared with group (1).

Fig. (3) shows the effects of using mixture herbs on loss weight during the experiment period.

It shows that the results of group (1) mixture herbs (tea 1) on loss weight, initial weight at the beginning of the experiment was 82.552 Kg and average weight at the end of the first week was 81.702 kg, the second week was 80.097 kg and the third week was 78.449 kg respectively. The highest significant effect (p <0.05) in loss weight was noticed in the first three weeks when compared to others weeks. However the following weeks gave 77.468 kg, 75.366 kg and 73.652 Kg respectively.

Fig. (4) shows the effects of using green tea on loss weight during the experiment period.

It shows the initial weight at the beginning of the experiment was 75.312kg, after drink green tea average weights gave 74.954 kg, 74.390 kg, 73.598 kg, 72.819 kg, 70.882 and 69.753 kg during the experimental weeks respectively. Also, detected that low significant decrease in body weight during the 1st four weeks while the results recorded significant decrease in body weight in weeks 5 and 6, at the end of the experiment, total loss weight was 5.559 kg with which illustrated the benefits of green tea and its positive impact on reducing weight.

Fig. (5) shows the comparative between the effect of using mixture herbs and green tea on loss weight:

The results in Fig. (5) showed that significant difference ($p < 0.05$) between the results of both experiments where group (1) gave significant increase in loss weight when compared with group (2) in weeks 1, 2, 3 and 6 while gave no significant ($p < 0.05$) increases in loss weight in weeks 4 and 5 at ($p < 0.05$) this is resulting from using many herbs at the same time, at the end of the experiment, total loss weight was 8.9 and 5.6 Kg in group (1) and group (2) respectively with significant difference at ($p < 0.05$). Therefore due to the best results of each effectiveness substances together.

Table 1: Basic data on 59 subjects taking herbs for reduction of weight

Variable	Subjects n=59 (%)
Age(years)	
18-30	40(67.2%)
31-39	19 (32.7%)
Sex	
Males	17 (29.3%)
Females	42(70.68%)
M/F Ratio	1: 2.48
diseases combination to obesity	
Diabetes	1(1.7%)
Hypertension	2(3.4%)
Mass Body Index	
Overweight	20(34.5%)
Morbid obesity	39(65.5%)
Adverse effects of green tea	
Insomnia	1(1.72%)
Diarrhea	1(1.27%)

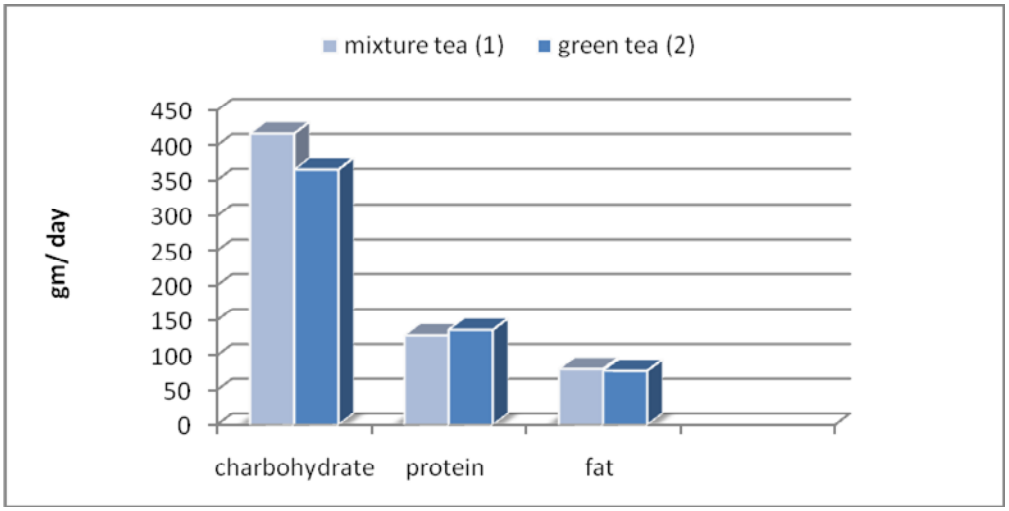

Fig 1: average of food intake from macronutrients.

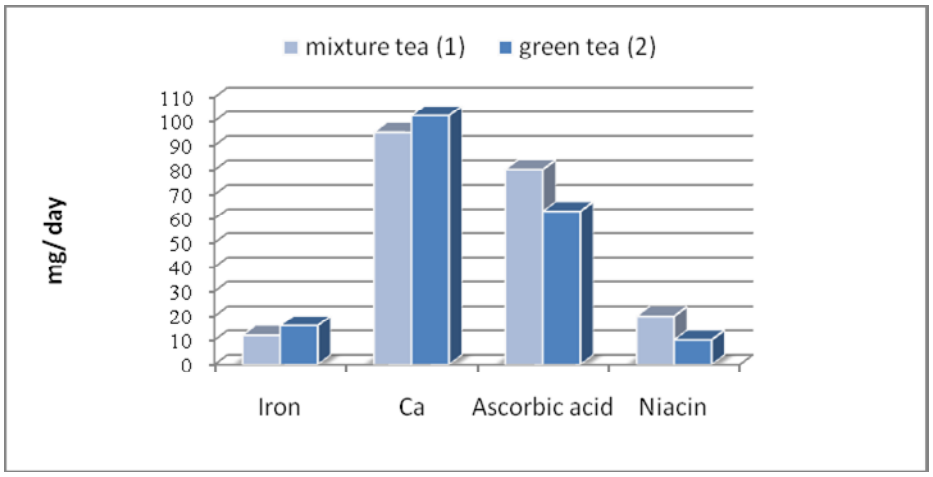

Fig 2: average of food intake from micronutrients.

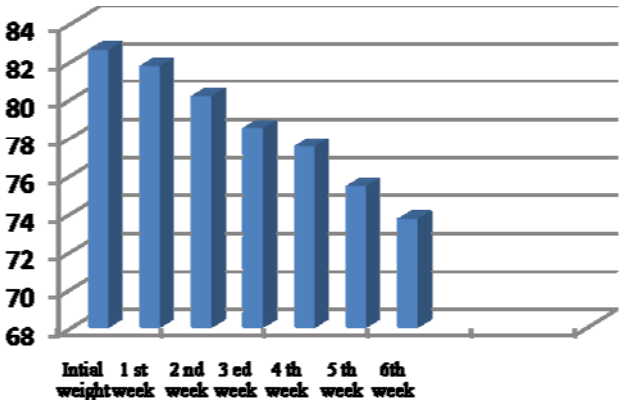

Fig 3: Effect of using mixture herbs on loss weight during the experimental period.

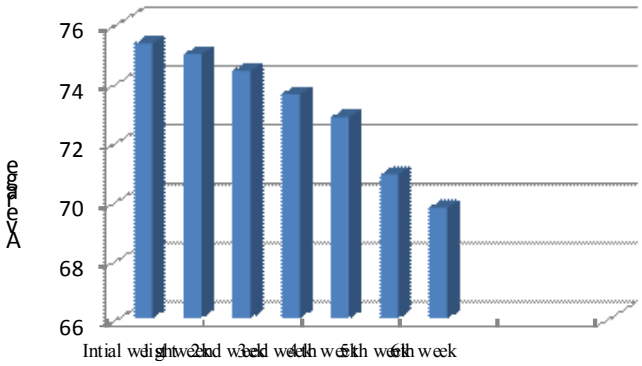

Fig 4: Effect of using green tea on loss weight during the experimental period.

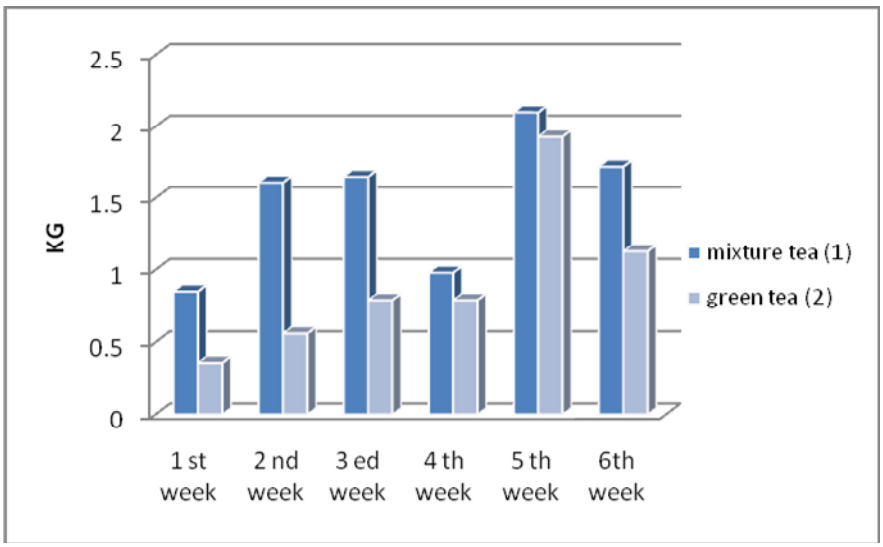

Fig 5: Comparative between the effect of using mixture herbs and green tea on loss weight.

4. Discussion

Obesity is becoming increasingly common and recognized as a major public health problem worldwide, Nowadays there is an increased trend for using plants in therapy "back to nature" instead of using synthetic drugs. In the present study found that the sample distribution accordingly the six with a higher percentage in females this confirm that obesity prevalence among females more than males. Results consistent with **Brwal (2007)** who recorded that prevalence 29% among women amounted to 27% among men, the rate of obesity was higher among women (24%) and (16%) among men. Also, **Serdula *et al.*(1999)** reported that, 29% of men and 24% of women claim to be attempting to lose weight or maintain previously achieved weight losses.

The results showed that the age of the subjects in youngest and adult's period in agreement with this result **Willett *et al.* (1999)** who indicated the seriousness of the epidemic of obesity among young people as result for lifestyle and bad eating habits and sometimes overlap. In addation**, Bach *et al.* (1996), Mori *et al.* (1999), Pellizzon *et al.* (2002) and Murase *et al.* (2002)** reported that the prevalence of obesity is increasing globally, and environmental and behavioral factors are believed to be primary causes of this phenomenon

In this study noted that prevalence the morbid obesity between the youngest and adults. The results agreed with **WHO (1997&1998)** who demonstrated that obesity is major health problem in many developed countries and its prevalence is increased in developing countries. On the other hand. **McNeely and Goa (1998)** reported that, Obesity has widespread impacts on the individual's physical and emotional well-being, as well as more distant repercussions on society as a whole through healthcare costs and reduced productivity.

The present study revealed that no significant ratio from the subjects suffer from diabetes and hypertension. This results agreed with **McNeely and Goa (1998)** who reported that there are many co-morbid conditions associated with obesity, including hypertension, diabetes, hyperlipidemia and heart disease**(Spalding *et al,* 2009;Gade *et al,* 2010).** Also the results agreed with **Williams and Pickup (2004)** who demonstrated that Diabetes mellitus is becoming more prevalent due to the increasing rates of obesity in youth and adulthood and sedentary lifestyles. There is a correlation between diabetes and obesity, often genetic factor that meet with obesity have converged to diabetes **(Cameron, 2010).**

In addition to, in this study noted that no significant adverse effects combination ingesting for green tea like insomnia and diarrhea. This result agreed with **Taylor and Wilt (1999)** who demonstrated that the only negative side effect reported from drinking green tea is 'insomnia' due to the fact that it contains caffeine. Patients sensitive to caffeine should use caffeine-free green tea or a caffeine-free extract. In the obtained results, there was no symptom associated with mixed herbs (senna, sage and mallow) which confirms the safety of using this mixture. This result agreed with **Lima *et al.* (2006) and Carla *et al.* (2009)** who demonstrated that there is no toxicity or adverse effects associated with sage consumption or changes in blood pressure and heart rate**.** The current study elicited marked significant increase in protein intake in both groups. These findings were in coincidence with **Baba *et al.* (1999)** who found a higher protein intake during weight loss may also prevent some of the inevitable loss of lean body mass and, thus, may enhance insulin sensitivity. This was in agreement with **Parker *et al.***

(2002) and Farnsworth *et al.* (2003) who reported that a high-protein weight-loss diet (28– 30% of energy from protein) from mixed sources enhances fat loss.

Also, the current study elicited marked significant increase in fat intake in both groups. These results were in line with the results reported by **Ravussin and Gautier (1999)** who detected that the positive energy balance is associated with weight gain and ultimately obesity and can arise from an elevated energy intake, reduced energy expenditure or a combination of the two**.** overeating and selection of inadequate diets is a contributor to the metabolic syndrome **(Abete *et al.*,2010).** Obesity is a metabolic disorder resulting from imbalance between metabolizable energy intake and expenditure **(Larsson *et al.,* 1981 and Hartz *et al.*,1983).** On the other hand, **Bach *et al.* (1996), Mori *et al.* (1999), Pellizzon *et al.* (2002) and Murase *et al.* (2002),** reported that the body has a limited ability to oxidize excess lipids, and a high-fat intake contributes to the development of obesity in both humans and rodents.

The present study revealed that the loss weight continued during experiment weeks in group (1) with increasing experiment period. This data illustrated the important and good effect for this mix of herbs to reduce body weight gradually. At the end of the experiment, total loss weight was 8.9 kg with positive rate which didn't affect the health situation and confirms what recent researches demonstrated the harmful effect for drugs which to use reduce weight on health which may give quick results. These results were in line with the results reported by **(Robert *et al.*, 2004) and (Wang and Bunkers, 2000).** revealed that country mallow from common dietary supplements used for weight loss, which increase energy expenditure.This result may be due to the mallow leaf extracts possess anti-inflammatory and antioxidant activities **(Shale et al., 2005 and Bouriche *et al.*, 2011).**

The results agreed with **Ninomiya *et al.* (2004)** who reported that the methanolic extract of Salvia officinalis L. leaves showed significant inhibitory effects on serum triglyceride. In addition, **Lima *et al.* (2005)** detected that oral administration of a Salvia officinalis infusion improved the liver antioxidant status in mice and rats. The results agreed with observed by **Alarcon-Aguilar *et al.* (2002) and Eidi and Zamanizadeh (2005)** who registered that common sage is among the plants to which antidiabetic properties and it showed to possess hypoglycaemic effects in normal and diabetic animals. *In vivo* treatments with Salvia fruticosa tea also reduced plasma glucose in rats **(Lima *et al.,* 2006).** Sage tea treatment reduced slightly plasma total cholesterol levels with a gradual reduction of LDL-C and a gradual increase of HDL-C levels **(Sullivan, 2002) and (Carla *et al.,* 2009).** In addition, **Milagro *et al,* (2006)** reported that, a link among increased fat depots, insulin resistance, and liver oxidative stress.

This effect was explained by **Raederstorff *et al.* (2003) and Plana *et al.* (2008)** who stated that the Several natural compounds in sage have been shown to act on cholesterol metabolism (by reducing its absorption or its synthesis), such as phytosterols and catechins and substances called snasoid-snasoid-b **(EL-sayed, 2009).**

This finding was in coincidence with the observation of **Kamal and Mohamed (2009)** who illustrated that sennosides in senna improve gastrointestinal motility and influence colonic motility thereby reducing fluid absorption and facilitates weight loss.

In this study, it was found that group (2) who ingested green tea gave low significant decrease in body weight during the 1st four weeks while the results recorded significant decrease in body weight in week (5) and (6), At the end of the experiment, total loss weight was 5.56 kg which illustrated the benefits of green tea and its positive impact on reducing weight. In agreement with this result **Yuan *et al.* (2006) and Merina (2005)** studied the anti-obesity and lipid-lowering effects of green tea consumption and found significantly decreased in serum total cholesterol, low density lipoprotein and triglycerides, the incidence of obesity was also lowered.

Also, this finding was in coincidence with the observation of **Abebe (2002)** who determined the effects of weight loss with the use of Tea sinensis as a significant weight loss. **Wolfram *et al.* (2006)** stated that Green tea, green tea catechins, and epigallocatechin gallate (EGCG) have been demonstrated in cell culture and animal models of obesity to reduce adipocyte differentiation and proliferation, lipogenesis, fat mass, body weight, fat absorption, mediating its anti-obesity effects. Studies conducted with human subjects report reduced body weight and body fat **(Chantre and Lairon , 2002)**. This effect explained by **Talat (2006)** who stated that the positive influence of green tea in reducing weight to its ability to burn fat and reduce the blood sugar level as a result it's containing of effective materials such as catechins and many antioxidants. In a further study made by **Dulloo *et al.* (1999)**, the ingestion of tea catechins stimulated O_2 consumption and energy expenditure and decreased the respiratory quotient in humans.

These findings were in coincidence with **Kirschmann (1996), Ashida (2004) and Chanadiri *et al.* (2005)** who found that the green tea is a metabolic stimulant and has been used for weight loss, its polyphenol content aids in body fat loss; prevents free-radical damage; is an anticoagulant; lowers LDL cholesterol and raises HDL, lowers blood cholesterol; maintains blood sugar levels and reduces the effects of

food poisoning. Previous reports led us to speculate that dietary tea catechins affect the development of obesity through the modulation of whole-body energy metabolism **(Dulloo *et al.*, 2000).**

In the obtained results, there was significant increase in loss weight in group (1) when compared with group (2), this is resulting from using many herbs at the same time, at the end of the experiment total loss weight was 8.9 and 5.6 Kg in group (1) and group (2) respectively.

This was in coincidence with the observation of **Murase *et al.* (2006)** who reported that the body-weight gain in mice fed tea Catechin and given exercise was significantly lower than that in mice receiving either exercise or tea Catechin alone. This confirmed that intake of green tea need to support by exercise or diet low fat to give best effect on loss weight further for, the combination herbs together give significant effect.

This effect was explained by **Grela (2000) and Schone *et al.* (2006)** who stated that the herbal slimmer generally work as metabolism boosters, fat burners, appetite suppressants and diuretics which eliminate excess water and laxatives, which expel waste and detoxify the digestive system so that our bodies use nutrients more efficiently and subsequently store less fat. In addition, the herbal mixture formulation contains antioxidants in mallow, stimulant laxatives that are present in senna. The herbal supplement also includes carminatives which are represented by sage **(Pitasawat *et al.*, 1998).**

Conclusion:

Based on our results, we conclude that the intake of mixture herbs succeeded in reducing body weight without adverse effect, therefore high fat intake. While, equivalent doses of green tea caused lower effect than herbs mixture during 6 weeks with non significant side effect. Therefore, it could be recommended that the using of herbal mixture (mallow, senna and sage) and green tea should be ingested as natural herbs to overweight and obese human beside the balanced diet from nutrients requirements, further investigations also should be carried out with different doses for more prolonged periods to complete the profile of the herbs with the studying of more effects at experimental animals in order to introduce it as a natural antiobesity agent.

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